Aeronautical Systems Center

Birthplace, Home & Future of Aerospace

U.S. AIR FORCE

Hexavalent Chromium Substitution Projects

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Overview of Presentation

- Background
- Scope of WNV Efforts
- Current and Past Projects
- Pending Projects
- Lessons Learned
- Recommendations/Conclusions

Background

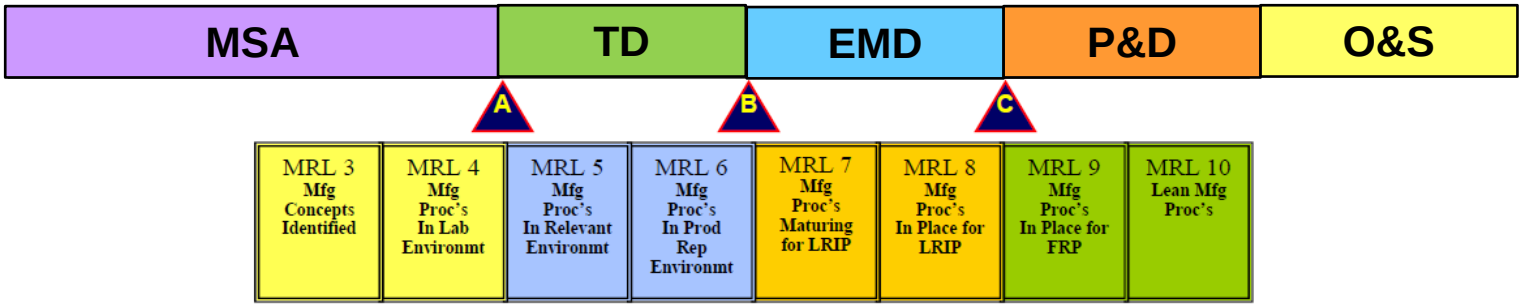
- **RoHS – EU regulations on electronics products (MCV 0.1%)**
- **REACH – EU legislation is imposing restrictions on Cr^{6+} use**
- **OSHA PEL reduction to 5 µg/m^3 (Feb 2006)**
- **Aerospace Industry Exemption to 25 µg/m^3**

USD(AT&L) Memorandum

- **Cr^{6+} has international restrictions, which will increase LCC & decrease Cr^{6+} availability**
- **Approve the use of alternatives when they perform adequately**
- **Document Cr^{6+} risks & alternative efforts in PESHE**
- **PEO will certify Cr^{6+} on new systems & legacy system modifications/updated maintenance procedures if no alt. exists**

PEO Certification Details

- Cost effectiveness of alternatives vs. Cr^{6+}
- Technical feasibility of alternatives
- ESOH Risk of alternatives vs. Cr^{6+}
- MRL of at least 8 for alternatives
- Materiel availability of alternatives vs. Cr^{6+}
- Corrosion performance differences as defined by service SMEs (AFCPCO & CTIO)

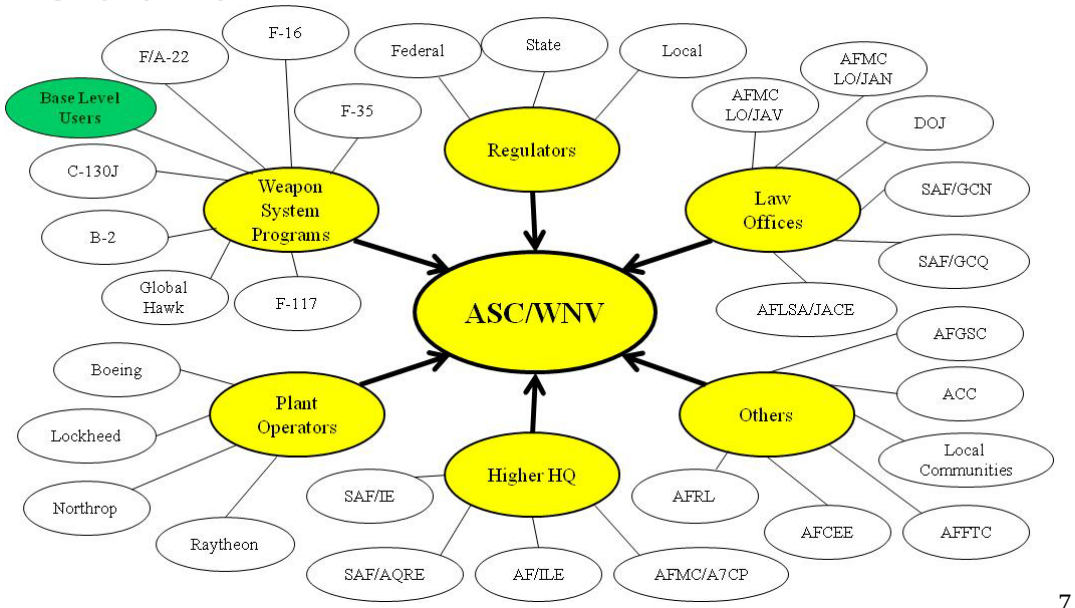


Scope of WNV Cr^{6+} Efforts

- **3010/3020 Funding – directly support the production of aircraft and missiles**
  - **Qualification and Validation of COTS**
- **Our Cr^{6+} efforts are on:**
  - **Corrosion Control of aircraft surfaces (Pretreatments, Primers and Coatings)**
  - **Corrosion Control of fasteners**
  - **Fuel tanks**
  - **Sealants**

Other Cr^{6+} Alternatives Efforts

- AFRL/RXSSO (CTIO)
- ALCs and AFCPCO, Robins AFB
- PEWG, Tinker AFB
- Other services such as NAVAIR, Army Aviation and Coast Guard
- Industry
- Academia



Status of Cr^{6+} on Some of the USAF Legacy Systems

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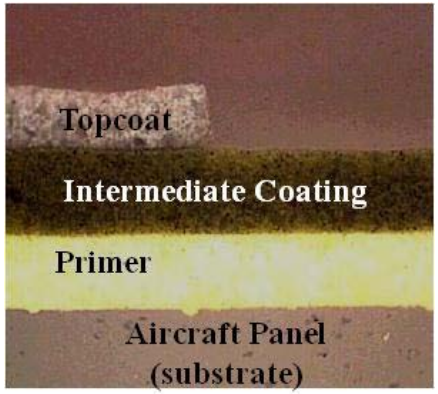
- **Non-Cr Surface Treatments and Non-Cr Primer**
  - **AETC (T-38)**
  - **WR-ALC (F-15)**
  - **ACC (F-16) Plan Mg Rich Primer & Non-Cr pre-treatment**
  - **F-35**
- **Non-Cr Surface Treatment (Prekote) and Cr Primer**
  - **OO-ALC (C-130, F-16, A-10)**
  - **AETC (T-6, T-38 and T1A)**
- **Both Cr Primers & Non-Cr primers as well as Cr Surface Treatment**
  - **F-22**

Non-Chrome Tie-coat
& touch-up primer

Current and Past WNV Cr^{6+} Efforts

- **Low-Cr Conversion Coating and NC Primer for C-130J OML**
- **Non-chrome primer – C130J IML**
- **Mg-Rich Treatment**
- **Non-chrome, Low VOC Fuel Tank Coating (Mil Spec AMS-C-27725)**
- **Barrier coat for F-16**

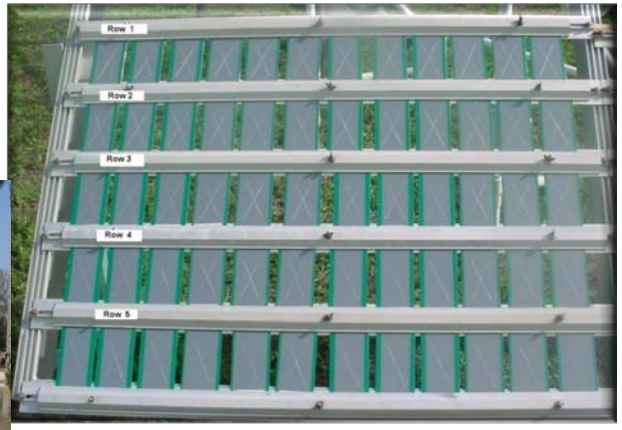


Barrier coat encapsulates chrome primer
Chrome primer application on F-16

Just starting WNV Cr^{6+} Projects

- **Non-chrome conversion coating (Touch-up)**
- **Non-chrome conversion coating (Immersion)**
- **Total Non-chrome stack-up C-130J OML**

- **Non-Threaded Dry Fastener for wet sealant Corrosion Protection**
- **Next Gen Mg-Rich Treatment**



Test Panels at FMRF
Static A/C (F-106) at FANG

Lessons Learned

- **Projects based on P2 needs from GOCO facilities & ASC Program Offices**
- **Projects benefit is on production**
  - **may impacts ACLs**
- **Projects must have environmental compliance (ESOH driver)**
- **Each weapon system requires Dem/Val of the alternative on their system**
- **OEM “process” change required Qual Testing & OEM Spec changes**

Lessons Learned Cont'd

- **Need to insert all Cr^{6+} related projects into DoD ASETSdefense database**
  - **WNVV has provide summaries of Cr^{6+} projects**
- **Depend on AFRL, Academia & Commercial entities to mature technologies (TRL 7)**
  - **Use ASETSdefense for DoD and Commercial applications**
  - **DTIC for DoD-related efforts**

Recommendations/Conclusions

- **Need to collaborate with others (e.g., AFRL, OEMs and depots) for future projects to avoid duplication of effort**
- **Some Cr^{6+} will be continued to be used:**
  - **Unless the alternatives are equal in corrosion control, have less LCC, are available and have less ESOH risk (as defined by MIL STD 882D)**
  - **Unless Cr^{6+} becomes no longer available due to increasing international & US regulations**

ASC Environmental & Health Risk Mgmt Branch (ASC/WNVV)

Weapon System Environment & Health Risk Footprint

Coatings

Plastics

Sealants

CFC Refrigerants

Engine Emissions

Weapon System Environment & Health Risk Management

Halon/Fire Suppression Agents

Corrosion Control

Hazardous Materials

Industrial Workshop Waste

Paints

Noise

Solvents

Cleaning Materials

ASC/WNVV supports System Acquisition Programs in managing these risks … promoting individual health, & protecting the environment